

CLAIMS

5 We Claim:

1. A nucleic acid synthesizer comprising a plurality of synthesis columns and an energy input component that imparts energy to said plurality of synthesis columns to increase nucleic acid synthesis reaction rate in said plurality of synthesis columns.

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2. The synthesizer of Claim 1, further comprising a fail-safe reagent delivery component configured to deliver one or more reagent solutions to said plurality of synthesis columns.

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3. The synthesizer of Claim 2, wherein said fail-safe reagent delivery component comprises a plurality of reagent tanks.

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4. The synthesizer of Claim 3, wherein said plurality of reagent tanks comprise one or more tanks selected from the group consisting of acetonitrile tanks, phosphoramidite tanks, argon gas tanks, oxidizer tanks, tetrazole tanks, and capping solution tanks.

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5. The synthesizer of Claim 4, wherein said reagent tanks further comprise a plurality of large volume containers, each said large volume container comprising at least one of said reagent solutions.

6. The synthesizer of Claim 5, wherein said large volume containers store in the range of about 2 liters to about 200 liters of said one or more reagent solutions.

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7. The synthesizer of Claim 1, wherein said energy input component comprises a heating component.

8. The synthesizer of Claim 8, wherein said heating component provides substantially uniform heat to said plurality of synthesis columns.

5 9. The synthesizer of Claim 1, wherein said energy input component provides heated reagent solutions to said plurality of synthesis columns.

10. The synthesizer of Claim 1, wherein said energy input heats said plurality of synthesis columns in the range of about 20 to about 60 degrees Celsius.

10 11. The synthesizer of Claim 1, wherein said energy input component comprises a heating coil.

15 12. The synthesizer of Claim 1, wherein said energy input component comprises a heat blanket.

13. The synthesizer of Claim 1, wherein said energy input component comprises a heated room.

20 14. The synthesizer of Claim 1, wherein said energy input component provides energy in the electromagnetic spectrum.

25 15. The synthesizer of Claim 1, wherein said energy input component comprises an oscillating member.

16. The synthesizer of Claim 1, wherein said energy input component provides a periodic energy input.

30 17. The synthesizer of Claim 1, wherein said energy input component provides a constant energy input.

18. The synthesizer of Claim 7, wherein said heating component comprises a resistance heater.

19. The synthesizer of Claim 7, wherein said heating component comprises a Peltier device.

20. The synthesizer of Claim 7, wherein said heating component comprises a magnetic induction device.

21. The synthesizer of Claim 7, wherein said heating component comprises a microwave device.

22. The synthesizer of Claim 7, wherein said heating component comprises heated fluid or gas.

23. The synthesizer of Claim 1, further comprising a mixing component that mixes reagents in said plurality of synthesis columns.

24. The synthesizer of Claim 23, wherein said mixing component is selected from the group consisting of an ultrasonic mixer, a magnetic mixer, a fluid oscillator, and a vibrational mixer.

25. The synthesizer of Claim 1, further comprising a reaction support, said reaction support configured to hold three or more synthesis columns.

26. The synthesizer of Claim 25, wherein said reaction support is configured for operation with a cleavage and deprotect component.

27. The synthesizer of Claim 26, further comprising sample tracking software configured to associated sample identification tags with samples that are processed by said synthesizer and said cleavage and deprotect component.

28. The synthesizer of Claim 27, wherein said sample tracking software is further configured to receive synthesis request information from a user, prior to sample processing by said synthesizer.

29. The synthesizer of Claim 26, further comprising a robotic component configured to transfer said reaction support from said synthesizer to said cleavage and deprotect component.

30. The synthesizer of Claim 29, wherein said robotic component is further configured to transfer said reaction support from said cleavage and deprotect component to a purification component.

31. A system comprising a plurality of networked nucleic acid synthesizers, one or more of said networked nucleic acid synthesizer comprising the nucleic acid synthesizer of Claim 1.

32. The system of Claim 31, further comprising a dispensing component that dispenses reagents to said plurality of networked nucleic acid synthesizers.

33. The system of Claim 32, wherein said dispensing component comprises a plurality of reagent supply tanks fluidically connected to said plurality of networked nucleic acid synthesizer, said tanks containing nucleic acid synthesis reagents, wherein at least one of said reagent supply tanks comprises at least 200 liters of acetonitrile, at least 200 liters of deblocking solution, at least 2 liters of amidite; at least 20 liters of tetrazole, at least 20 liters of capping solution, or at least 20 liters of oxidizers

34. The system of Claim 33, wherein said reagent supply tanks are contained in a first room and said plurality of nucleic acid synthesizers are contained in a second room.

35. The system of Claim 32, wherein said dispensing component comprises:

- a. a plurality of valves for controlling dispensing of a plurality of reagent solutions; and
- b. a plurality of dispense lines wherein each of the plurality of the dispense lines is coupled to a corresponding one of the plurality of valves for delivering one of the plurality of reagent solutions to a selected synthesis column.

36. A nucleic acid synthesizer comprising a plurality of synthesis columns and a mixing component that mixes reagents in said plurality of synthesis columns.

37. The nucleic acid synthesizer of Claim 36, wherein said mixer is selected from the group consisting of an ultrasonic mixer, a magnetic mixer, a fluid oscillator, and a vibrational mixer.

38. The nucleic acid synthesizer of Claim 36, further comprising an energy input component that imparts energy to said plurality of synthesis columns to increase nucleic acid synthesis reaction rate in said plurality of synthesis columns.